Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	ET Docket No. 04-186
Unlicensed Operation in the TV Broadcast Bands	)	
	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	ET Docket No. 02-380
	)	
	)	

COMMENTS OF HARRIS CORPORATION

Harris Corporation ("Harris") respectfully submits these comments in response to the Federal Communications Commission's ("Commission's" or "FCC") Notice of Proposed Rulemaking ("NPRM") in the above captioned proceeding proposing unlicensed radio transmitters operate in the broadcast television spectrum at locations where that spectrum is not being used.[1]

I. Introduction and Summary

Harris is an international communications equipment company with four operating divisions that offer products and services in the microwave, broadcast, secure tactical radio, and government communications systems markets. As the world's leading broadcast transmission equipment supplier, Harris' Broadcast Communication Division is the leader in digital solutions for television and radio broadcasting and has been at the forefront of the transition to digital television, supplying the majority of the digital television transmitters and encoders in the United States.

[1] In the Matter of Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186, rel. May 25, 2004 (hereinafter "NPRM").

Harris' Microwave Communications Division is the largest supplier of microwave systems in North America and one of the largest suppliers of fixed wireless solutions worldwide. It offers a broad range of wireless products, systems and services to cellular, PCS, private, and other public network operators. The products include both point-to-point and point-to-multipoint radio systems ranging from 2 to 38 GHz and are used for network deployments, network extensions, and capacity upgrades.

The Harris customer base includes, both licensed and unlicensed service providers, serving a variety of markets including 802.11, 802.15, 802.16, analog and digital television, and software-defined radio. Our customers include cellular service providers, wireless ISPs, broadcasters, and agencies engaged in public safety. Harris is in the unique position of understanding the issues presented in the NPRM from the perspectives of several key stakeholders: the broadcasting industry, the public safety industry, and the wireless industry. As such, Harris supports the Commission's efforts to provide for more efficient and effective use of the television spectrum and supports efforts that encourage the development of new and innovative services for businesses and consumers.

However, as the Commission aptly noted in the NPRM, broadcasters are currently undergoing a transition to digital operation, during which channel availability is likely to change more frequently. Moreover, the Commission has recognized the importance of protecting the primary users of the television spectrum (broadcasters) from harmful interference. Therefore, Harris recommends that the Commission consider adopting the following approach when analyzing the viability of unlicensed devices operating in the television bands: 1) Prior to permitting unlicensed users to operate in the television

spectrum, the Commission should resolve issues relating to the digital conversion that could be affected by the operation of such devices. Specific areas of concern include: finalizing the DTV Table of Allotments for full power stations, low power television stations, translators and booster stations and resolving technical issues, such as use of distributed transmission technologies; 2) Harris concurs with the Commission's recommendation to require unlicensed devices to be equipped with interference avoidance mechanisms to identify unused television frequencies.

II. The Commission Should Resolve the Issues Relating to The Digital Conversion Prior to Authorizing Unlicensed Devices to Operate in the TV Spectrum.

The Commission has made significant progress in ensuring that the digital television transition occurs in an efficient and timely manner. In addition to moving forward on "Plug and Play" and "Digital Tuner" issues, the Commission recently adopted an order outlining the steps for the channel election process and a plan to finalize the DTV Table of Allotments.[2] The Commission also has set forth a time line for the full replication and maximization of television facilities to ensure that broadcasters are providing service to all the consumers in their market.

According to the Commission's press release, television broadcast station licensees will participate in a channel election process that will continue until January 2006.[3] In August 2006, the Commission plans on issuing a notice of proposed rulemaking, which will seek comments on a new DTV Table of Allotments. While Harris commends the Commission for adopting a plan for moving the digital transition

[2] News Release, August 4, 2004, FCC Takes Next Steps to Promote Digital TV Transition.
[3] *Id.*

forward, the Commission's decision adopts a timeline and a process for moving forward only—the difficult phase has yet to begin.

The next 2-3 years are critical in ensuring an efficient and successful DTV transition. The Commission should forgo miring the success of the transition with questions about interference to the DTV service. Thus, Harris urges the Commission to delay unlicensed devices access to the television bands until all potential issues associated with the DTV transition are resolved. Indeed, to proceed without fully appreciating the potential interference problems that may result from full replication and maximization may result in consumer dissatisfaction with DTV services.

As the Commission noted in the NPRM, during the transition, both analog and digital stations are operating on channels 2-69, but after the transition, digital-only operations will be repacked to channels 2-51, which means that some 175 new DTV stations must be accommodated. As the Commission is aware, most stations have yet to elect a permanent core channel, and there is no real sense of how much vacant spectrum would be available for unlicensed operation after the close of the transition. Moreover, the amount of vacant spectrum will vary significantly from market to market, depending on the density of DTV stations. The FCC must also consider the approximately 7,200 Class A, low-power television stations, translators and repeaters that will need final channel allotments.[4]

With only about half of stations operating thus far at <u>full</u> DTV power, a number of questions remain about the robustness of over-the-air reception of DTV signals. In fact, in its recent order, the Commission committed to opening a fast-track proceeding on

[4] Our calculations show that as of September 30, 2004, there are approximately 7,189 Class A, low-power television stations, translators and boosters. *See* FCC http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-253919A1.doc.

distributed transmission technology while agreeing to consider individual deployments on a case-by-case basis, in the interim.[5] In its evaluation of distributed transmission technologies, the Commission must evaluate the viability of the distributed transmission technology, analyze whether to grant primary status to multiple transmitters and adopt a licensing methodology. Allowing unlicensed devices to operate in the television band prior to the resolution of these critical issues would complicate the implementation of digital television. It also would pose significant problems for those unlicensed users utilizing the television band, only to realize that their operations are being interfered with or are the cause of interference.

Harris recommends that the Commission complete its work in the DTV transition by finalizing the DTV channel allotments and adopting final technical rules for distributed transmission technologies prior to permitting unlicensed devices to operate in the television band. As the Commission noted in the NPRM:

> With digital operations, interference or inadequate signal typically results in abrupt loss of service rather than the gradual degradation that occurs with analog operations. That is, with DTV, service goes from a perfect picture to no picture with very small changes in interference or signal levels, as the DTV minimum threshold for service is crossed.[6]

If the Commission proceeds without finalizing these issues, interference from unlicensed devices could seriously hamper the rollout of digital television. This is particularly true in the case of interference caused by personal/portable devices, in which interference would be difficult to identify.

[5] New Release August 4, 2004, FCC Takes Next Steps to Promote Digital TV Transition.
[6] NPRM at footnote 30.

III. All Unlicensed Devices Should Be Equipped With Interference Avoidance Mechanisms

Upon resolution of the issues associated with the DTV transition, unlicensed devices should be permitted to operate in vacant television spectrum as long as those devices are equipped with interference avoidance mechanisms. The Commission identifies two general functional categories for unlicensed broadband services: 1) lower power "personal/portable" unlicensed devices, such as Wi-Fi like cards in laptop computers or wireless in-home LANs; and, 2) higher power "fixed/access" unlicensed devices that operate from fixed locations and may be used to provide commercial services such as wireless broadband Internet access.[7]

For the lower power "personal/portable" unlicensed devices, Harris generally supports the Commission's recommendation that using a geo-location technology in concert with an internal database would determine whether the unlicensed device is located far enough outside the protected service area of a licensed station to avoid causing harmful interference. The software to set-up the device would incorporate a FCC provided database of licensed frequencies that could be matched via a geo-location technique. The unlicensed device would then be able to search this database for available frequencies in which it could operate thereby preventing interference. Harris requests that the Commission adopt rules that mandate the continuous updating of all such databases to ensure accurate information is available to the unlicensed devices.[8]

The Commission has proposed limiting the maximum power output of these devices to 100 milliwatts and to require that such devices have a permanently attached

[7] NPRM at para. 19.

[8] A potential additional interference mechanism could include creating a product warranty/registration database so that the FCC or other government agency has the ability to contact the interfering party in the event that interference is being caused to a licensed service provider.

integral antennal with a maximum permissible gain of 6 dBi.[9] Harris strongly supports these proposals and recommends that the Commission adopt rules enforcing such limitations.

In addition, the Commission proposes that such devices automatically and periodically transmit a unique identification signal.[10] Harris strongly supports the adoption of such a rule and urges the Commission to require that unlicensed devices transmit an identification signal that includes the manufacturer name and model number, its FCC identifier, and its unique serial number. Harris urges the Commission to mandate a periodic transmission of such identifying information of not less than every 30 seconds.

For the higher power "fixed/access" unlicensed devices, the Commission proposes to require that such devices incorporate a method for determining geographic location with a minimum accuracy of 30 meters. Harris urges the Commission to adopt the GPS method for the higher-powered "fixed/access" unlicensed devices because the GPS method will provide location data that could be continuously transmitted as part of the device's identification data. Specifically, the device's identification should include manufacturer name and model number, unique serial number and geographic coordinates of the device based on GPS data. In the event that such location data is lost, the base station device should be required to automatically shut down after 10 contiguous minutes of loss of GPS signal lock.

[9] NPRM at para. 22.
[10] *Id*.

Also, fixed/access unlicensed devices equipped with the GPS receiver should automatically consult an internal database identifying frequencies to protect by location.[11] The internal database should include all licensed services and their authorized coverage areas and be made available to drive all fixed/access base stations.[12] Until such time that the licensed TV spectrum has transitioned to digital, it is likely that the database will need to be updated automatically at least weekly and be accessible online by the base stations and the CPE. Should the base stations, for whatever reason, not receive periodic updates, the base station should be required to shut down automatically to ensure that no interference is caused to licensed services. Moreover, both base stations and CPE devices must incorporate off-air RF sensing mechanisms to ensure detection of frequencies in-use. The detection of a signal in-use would ensure that the network avoid such frequencies.[13]

Although Harris supports the utilization of professional installers for correctly aligning antennas, Harris recommends that the CPE be "plug and play." Harris does not support the Commission's proposal to utilize installers to provide the device's coordinates to a frequency coordinator or other party that maintains an appropriate and current database to determine which TV channels are unused at the device's location. The difficulties in ascertaining who would qualify as a professional installer juxtaposed with potential for human error makes the installer option less viable that a GPS based system. The Commission's other proposals include utilizing "control signal method technologies" that would require unlicensed operators to access a database on a periodic

[11] One could access this database by inputting zip codes or location coordinates.

[12] The database could potentially be compiled by a designated group, such as the Commission, IEEE, or a consortium of broadcasters.

[13] Frequencies in-use include licensed and unlicensed frequencies.

basis to ensure that the channels on which the device operates remain unused. Although this approach seems promising, Harris is concerned that without frequent updates, the unlicensed operator will still be in the position of potentially causing interference.

Finally, Harris recommends that the fixed/access base stations and CPE transmit a unique identification signal consisting of manufacturer name and model number, FCC identifier, its unique serial number and GPS coordinates of the device as determined by the on-board GPS sensor. This would allow efficient and expeditious access to data regarding an interfering signal by licensed users.

Regardless of the approach that the Commission adopts, the Commission should consider its highest priority to be protecting licensed operators from interference.

IV. The Equipment Authorization Procedures For Unlicensed Devices Must Include Safeguards To Prevent Interference.

As the Commission noted in the NPRM, unlicensed transmitters must be tested to show compliance with the applicable technical requirements in Part 15 of the rules before they can be certified. The types of tests required include the maximum output power or field strength, spurious emissions, occupied bandwidth and operating frequency. In addition, the manufacturer must demonstrate that their product complies with any database requirements ultimately adopted by the Commission and that such devices are capable of having the associated databases periodically and automatically updated. For example, the fixed/access base stations' database discussed above, delineating all active licensed services and assigned coverage areas, and associated GPS data, must be able to be updated in a regular and timely manner. Harris believes that such a database should be

updated at least weekly and in the case where such updates are not occurring, the fixed/access base station should be able to automatically shut itself down.

For portable devices, many challenging issues remain such as determining licensed signal detection sensitivity, particularly when the portable device is indoors; determining GPS coordinates when the portable device is indoors; determining how to gain access to, and responsibility for, an updated database for portable equipment that does not utilize a base station; and distinguishing when a portable device in remote regions is far from any licensed broadcasters when it has no database access opportunity.

Furthermore, given that different vendors of CPE devices may incorporate proprietary methods for RF sensing of DTV pilot frequencies or analog video/ audio carriers (i.e., unique detection algorithms, measurement methods and implementations), Harris recommends that equipment authorization requirements include methods for permitting the base stations to conduct verification and validation of sensor inputs from different vendor CPE to a given base station. Such testing would ensure that sensors from all manufacturers comply with a similar standard identifiable by all base stations.

V. The Commission Should Impose Penalties Upon Users of Unlicensed Devices That Are Causing Interference to Licensed Operations On A Continuous and Willful Basis.

When a user of an unlicensed device causing interference to licensed operations is identified, that user has an obligation to take corrective measures. If such measures are not taken, the Commission must have a mechanism in place to force such action. Such a mechanism could include imposition of fines and confiscation of infringing equipment.

VI. Conclusion

The Commission has made tremendous progress on the digital television transition. Harris commends the Commission's commitment to this difficult and contentious issue. Now, however, is not the time to provide unlicensed devices access to spectrum that may or may not be available. Harris recommends that the Commission delay such use by unlicensed devices until all issues associated with the deployment of DTV, including finalizing a DTV Table of Allotments and adopting technical rules relating to distributed transmission technologies, are resolved. Further, Harris respectfully recommends that the Commission consider the interference protection measurements outlined above to ensure that licensed services are protected from interference.

Respectfully Submitted,

HARRIS CORPORATION

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November 30, 2004